AMENDMENTS TO THE CLAIMS

Claim 1 (currently amended). An elongate microwave radiator for insertion into a living body to treat biological tissue at a predetermined operating frequency, the radiator comprising:—a monopole antenna at its tip, the monopole antenna comprising:

a monopole; and

dielectric material surrounding the monopole, the dielectric material being configured to act as a resonator at said predetermined operating frequency, and encompassing generally the whole of the near-field radiation emitted by the monopole.

Claims 2-4 (cancelled).

Claim 5 (currently amended). A radiator as claimed in claim 1 in which the dielectric material of the monopole antenna comprises a generally cylindrical body with the monopole of the monopole antenna extending axially at its center a distance L.

Claim 6 (currently amended). A radiator as claimed in claim 1 in which the radial extent of the dielectric material of the monopole antenna relative to the monopole of the monopole antenna is generally equal to half a wavelength of radiation in the dielectric material at said predetermined operating frequency.

Claim 7 (currently amended). A radiator as claimed in claim 1 in which the dielectric material of the monopole antenna is such that it has a dielectric constant at its core which is higher than the dielectric constant at its outer periphery, the latter being more closely matched to that of said biological tissue.

Claim 8 (currently amended). A radiator as claimed in claim 7 in which the dielectric material of the monopole antenna comprises an inner core and an outer layer, each of a different dielectric constant.

Claim 9 (currently amended). A radiator as claimed in claim 8 in which the inner core and outer layer have those dimensions that extend from the monopole of the monopole antenna, which are determined in accordance with the dielectric constant of each so that the overall dimension is a predetermined fraction of the nominal wavelength of the radiation in the dielectric.

Claim 10 (previously presented). A radiator as claimed in claim 9 in which the inner core and outer layer each have a dimension generally equal to a quarter of the wavelength of radiation therein.

Claim 11 (previously presented). A radiator as claimed in claim 8 in which the outer layer is formed with indentations in its outer surface which serve to reduce the dielectric constant in this region when the indentations are filled with other matter.

Claim 12 (currently amended). A radiator as claimed in claim 7 in which the dielectric constant of the dielectric material of the monopole antenna varies continuously in space over at least a part of the distance from the monopole of the monopole antenna.

Claim 13 (currently amended). A radiator as claimed in claim 1 which has a tip portion that extends beyond the end of the monopole of the monopole antenna.

Claim 14 (previously presented). A radiator as claimed in claim 13 in which the tip portion is pointed to assist penetration of biological matter.

Claim 15 (previously presented). A radiator as claimed in claim 14 in which the tip portion is composed of a different material to the dielectric material.

Claim 16 (previously presented). A radiator as claimed in claim 13 in which the tip portion is an extension of the dielectric material and is rounded so as to support forward transmission of radiation.

Claim 17 (previously presented). A radiator as claimed in claim 16 in which the tip portion is generally hemispherical.

Claim 18 (previously presented). A radiator as claimed in claim 17 in which the tip portion has a radius generally equal to half the wavelength of the radiation in the dielectric at said predetermined frequency.

Claim 19 (currently amended). A radiator as claimed in claim 1 in which the elongate device comprises a coaxial conductor with a central conductor that projects beyond outer screening of the coaxial conductor at the distal end to form the monopole of the monopole antenna.

Claim 20 (currently amended). A radiator as claimed in claim 19 in which the monopole of the monopole antenna has a length generally equal to half the wavelength of the radiation in the dielectric.

Claim 21 (previously presented). A radiator as claimed in claim 19 including a transformer between the coaxial conductor and the dielectric material to reduce reflection of radiation back into the coaxial conductor at the boundary with the dielectric material.

Claim 22 (previously presented). A radiator as claimed in claim 21 in which the transformer includes a space within the coaxial conductor into which packing of the coaxial conductor can expand.

Claim 23 (currently amended). An elongate radiator for insertion into a living body to treat biological tissue at a predetermined operating frequency, the radiator comprising: a monopole antenna at its tip, the monopole antenna comprising:

a monopole; and

dielectric material surrounding and extending beyond the monopole, the dielectric material terminating in a rounded tip portion and configured to act as a resonator at said predetermined operating frequency thereby to enhance transmission of radiation in the forward direction.

Claim 24 (cancelled).

Claim 25 (previously presented). A radiator as claimed in claim 23 in which the tip portion is generally hemispherical.

Claim 26 (previously presented). A radiator as claimed in claim 25 in which the tip portion has a radius generally equal to half the wavelength of the radiation in the dielectric.

Claim 27 (currently amended). A radiator as claimed in claim 23 in which the monopole of the monopole antenna has a length L generally equal to half a wavelength of said radiation in the dielectric material of the monopole antenna at said predetermined operating frequency.

Claim 28 (currently amended). A radiator as claimed in claim 23 in which the dielectric material of the monopole antenna comprises a generally cylindrical body with the monopole of the monopole antenna extending axially at its center said distance L.

Claim 29 (currently amended). A radiator as claimed in claim 23 in which the radial extent of the dielectric material of the monopole antenna relative to the monopole of the monopole antenna is generally equal to half a wavelength of radiation in the dielectric material at said predetermined operating frequency.

Claim 30 (currently amended). A method of coupling radiation into biological material, the radiation being generated by an applicator comprising a monopole antenna including a monopole surrounded by a dielectric body, the method comprising the steps of:

configuring the dielectric body of the monopole antenna to act as a resonator; and

selecting the dielectric constant of the body in accordance with the wavelength of the radiation in the dielectric so that generally the whole of the near-field of the radiation is encompassed by the dielectric body.

Claim 31 (cancelled).

Claim 32 (currently amended). A method as claimed in claim 30 in which the dielectric body of the antenna extends from the monopole of the antenna a distance generally equal to half a wavelength of the radiation in the dielectric.

Claim 33 (currently amended). A method as claimed in claim 30 in which the major dimension of the monopole antenna is its length, which is generally equal to half a wavelength of the radiation in the dielectric.

Claim 34 (previously presented). A method as claimed in claim 30 in which the dielectric body is located in relation to the biological material so that the far-field radiation lies within the biological material.

Claim 35 (previously presented). A method as claimed in claim 30 in which the dielectric constant of the body is high, but is lower than that of the biological material.

Claim 36 (previously presented). A method as claimed in claim 30 in which the dielectric constant of the dielectric body varies, and is higher at its core than its outer periphery, and the dielectric constant at its outer periphery is lower than that of the surrounding biological matter.

Claim 37 (previously presented). A method as claimed in claim 35 in which the dielectric constant at the core is greater than the dielectric constant of the biological matter.

Claim 38 (currently amended). A method of coupling radiation into biological material, the method including the steps of:

providing an elongate applicator comprising a monopole antenna including a monopole surrounded by a dielectric body, the dielectric body of the antenna being configured so as to extend axially of, and beyond the end of, the monopole of the antenna and terminate in a rounded end portion that has a progressively reducing cross section along the axis away from the monopole of the antenna;

causing the dielectric body of the antenna to act as a resonator at the predetermined operating frequency; and

transmitting radiation from the rounded end.

Claim 39 (previously presented). A method as claimed in claim 38 in which the step of transmitting radiation includes partially reflecting the radiation internally of the dielectric body so as to be transmitted in the forward direction.

Claim 40 (previously presented). A method as claimed in claim 39 in which the step of providing an elongate applicator includes providing a dielectric body having a dielectric constant that is high but is lower than that of the biological material.

Claim 41 (previously presented). A method as claimed in claim 38 in which the step of providing an elongate applicator includes providing a dielectric body that has a generally hemispherical tip portion with a radius generally equal to half the wavelength of the radiation in the dielectric.

Claim 42 (currently amended). A method as claimed in claim 38 in which the step of providing an elongate applicator includes providing a monopole of the antenna, which ~~that~~ has a length generally equal to half the wavelength of the radiation in the dielectric body of the antenna.

Claim 43 (currently amended). A method as claimed in claim 38 in which the step of providing an elongate applicator includes providing a dielectric body of the antenna that extends from the monopole of the antenna a distance generally equal to half the wavelength of the radiation in the dielectric body.

Claim 44 (previously presented). A method of treating a tumor in a liver using a radiation applicator comprising an elongate radiator body with a pointed tip for insertion into the liver and a power input to generate microwaves within the body and to transmit microwave radiation into the liver, the method comprising the steps of:

penetrating the liver with the pointed tip;

inserting the body into the liver to the region of the tumor; and

powering the applicator via the power input to transmit microwaves and heat said region of the tumor.

Claim 45 (currently amended). An elongate microwave radiator for insertion into a living body to treat biological material at a predetermined operating frequency, the radiator comprising a monopole antenna that includes:

a monopole; and

dielectric material surrounding the monopole, the length of the monopole and the dielectric constant and dimensions of the dielectric material relative to the monopole being selected in relation to the predetermined operating frequency of the applicator such that the dielectric material acts as a resonator at the predetermined operating frequency and encompasses generally the whole of the near-field radiation emitted by the monopole.